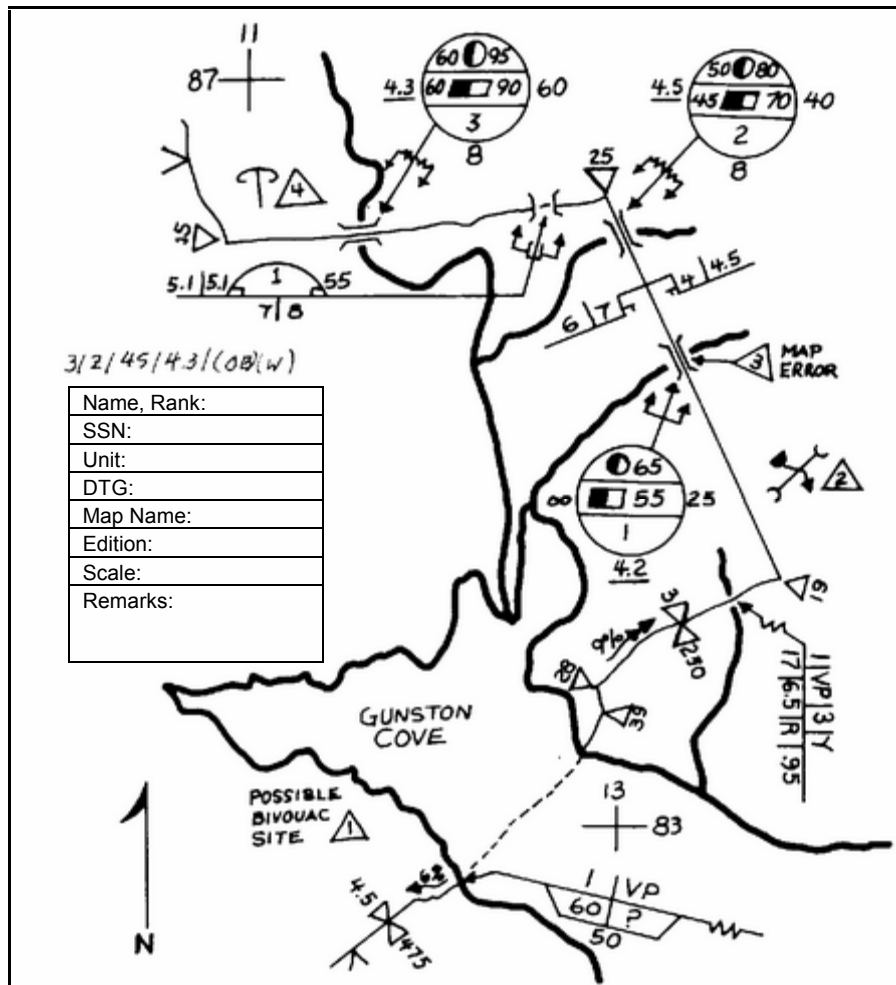


US ARMY ENGINEER SCHOOL

CONDUCT RECONNAISSANCE
PART I



THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT
ARMY CORRESPONDENCE COURSE PROGRAM

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CONDUCT RECONNAISSANCE PART I

Subcourse EN 5621

EDITION A

United States Army Engineer School
Fort Leonard Wood, Missouri 65473

4 Credit Hours

Edition Date: May 2002

SUBCOURSE OVERVIEW

This subcourse (part of the combat engineer military occupational specialty (MOS) 12B skill level 3 course) is designed to provide the knowledge required to perform tasks relating to recording, reporting, and documenting information about a hasty or deliberate route reconnaissance. This subcourse describes how to prepare a route reconnaissance overlay and how to classify a route using the route classification formula. Although this subcourse is developed at skill level 3, it is designed in a step-by-step format so that an individual without reconnaissance experience can successfully complete the course. Work must be accomplished in a manner consistent with environmental laws and regulations.

There are no prerequisites for this subcourse.

This subcourse reflects the current doctrine when this subcourse was prepared. In your work situation, always refer to the latest official publications.

Unless otherwise stated, the masculine gender of singular pronouns is used to refer to both men and women.

TERMINAL LEARNING OBJECTIVE:

ACTION: You will learn to prepare a route reconnaissance overlay.

CONDITION: You will be given the material in this subcourse and an Army Correspondence Course Program (ACCP) examination response sheet.

STANDARD: To demonstrate competency of this task, you must achieve a minimum of 70 percent on the subcourse examination.

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ADMINISTRATIVE INSTRUCTIONS

1. Number of lessons in this subcourse: Two.
2. Materials you need in addition to this booklet are a number 2 lead pencil, paper, the ACCP examination response sheet, and the preaddressed envelope provided with this subcourse.
3. Supervisory requirements: None.
4. References: The following publications provide additional information about the material in this subcourse. You do not need these materials to complete this subcourse.
 - Department of Army (DA) Form 1711-R. *Engineer Reconnaissance Report*. 1 May 1985.
 - FM 101-5-1. *Operational Terms and Graphics (MCRP 5-2A)*. 30 September 1997.
 - FM 5-170. *Engineer Reconnaissance*. 5 May 1998.
 - FM 5-34. *Engineer Field Data*. 30 August 1999.
 - Standardization Agreement (STANAG) 2253. *Roads and Road Structures*. 29 January 1982.

GRADING AND CERTIFICATION INSTRUCTIONS

Examination: This subcourse contains a multiple-choice examination covering the material in the lessons. After studying the lessons and working through the practice exercises, complete the examination. Mark your answers in the subcourse booklet, and then transfer them to the ACCP examination response sheet. Completely blacken the lettered oval that corresponds to your selection (A, B, C, or D). Use a number 2 lead pencil to mark your responses. When you complete the ACCP examination response sheet, mail it in the preaddressed envelope provided with this subcourse. You will receive an examination score in the mail. You will receive four credit hours for successful completion of this examination.

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LESSON 1

ROUTE RECONNAISSANCE OVERLAY

Critical Task: 052-196-3065

OVERVIEW

LESSON DESCRIPTION:

In this lesson, you will learn how to prepare a route reconnaissance overlay. You will learn what items are required on an overlay and the symbols used.

TERMINAL LEARNING OBJECTIVE:

- ACTION:** You will identify the information and procedures required to prepare a route reconnaissance overlay.
- CONDITION:** You will be given the material contained in this lesson.
- STANDARD:** You will correctly answer practice exercise questions at the end of this lesson.
- REFERENCES:** The material contained in this lesson was derived from the following publications: FMs 101-5-1, 5-170, and 5-34 and STANAG 2253.

INTRODUCTION

Route reconnaissance is used to gather information about enemy activities, obstacles (including chemical or radiological contamination), route conditions, and critical terrain features along a specific route. The techniques that are used and the requirements for a route reconnaissance are less time consuming and are performed more rapidly than other types of reconnaissance. Two methods used for performing a route reconnaissance are—hasty and deliberate.

Hasty route reconnaissance is usually performed when required time and qualified personnel are not available. It is used to determine the immediate trafficability of a route for military traffic. A hasty reconnaissance report usually consists of an overlay, supplemented by additional reports (dependent on the detail required) about various aspects of the terrain.

Deliberate route reconnaissance is performed when enough time and qualified personnel are available. It provides the necessary data for a thorough analysis and classification of significant terrain features along a route. Information about repair or demolition procedures is also reported. An overlay is used to show the exact location of each reconnoitered terrain feature.

PART A – ITEMS REQUIRED ON AN OVERLAY

A route reconnaissance overlay is an accurate and concise report of the conditions affecting traffic flow along a specified route. Route reconnaissance overlays are required for both hasty and deliberate reconnaissance. An overlay and a *DA Form 1711-R* will usually satisfy the requirements of a hasty route reconnaissance. If more detail is required to support the reconnaissance, the overlay is supplemented with written reports describing critical route characteristics in more detail.

1-1. Drawn Route. An overlay is a concise drawing of a route and its characteristics. When possible, it is prepared on transparent paper. The overlay shows the reconnoitered route, drawn to scale. The “limit of sector” will be shown by using the limit-of-sector symbols (*Figure 1-1*). Drawing the route to scale and showing the limits of sector will identify the portion of the route that has been reconnoitered.

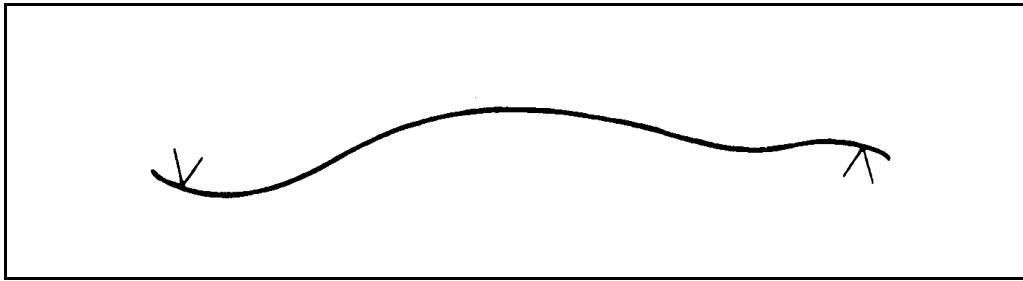


Figure 1-1. Route Drawn to Scale With Limit-of-Sector Symbols

1-2. Grid Reference Points. To facilitate the replacing of the overlay, in relationship with the map used to trace it, use grid reference lines. Trace the intersections of grid reference lines from the map to the overlay. Identify the lines with the grid line numbers from the map. There must be a minimum of two grid reference points on each overlay (*Figure 1-2*).

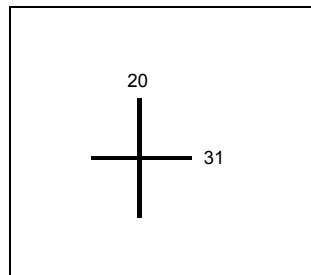


Figure 1-2. Grid Reference Points

1-3. North-Seeking Arrow. To allow proper orientation, a north-seeking arrow must be located somewhere on the overlay. North can be shown by using either the grid or the magnetic north. When grid north (GN) is used, indicate such by marking the arrow as GN. Indicate magnetic north (MN) by marking the arrow as MN. GN is most commonly used on overlays because of convenience (*Figure 1-3*).

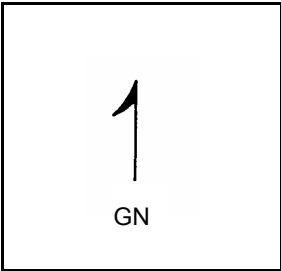


Figure 1-3. North-Seeking Arrow

1-4. Title Block. To identify the person performing a reconnaissance, a title block (*Figure 1-4*) is placed on the overlay. The title block will include his name, rank, SSN, and unit; the date time group (DTG); the map name; the map edition; the map scale; and remarks. The location of the title block on the overlay will depend on the space available.

Name, Rank:
SSN:
Unit:
DTG:
Map Name:
Edition:
Scale:
Remarks:

Figure 1-4. Title Block

1-5. Route Classification Formula. A route classification formula is the last required item on the overlay. The route classification formula is located directly above the title block and briefly describes a specific route. The formula is made up of a series of numbers and letters that express (in a standard sequence) the route’s width, type, lowest military load classification (MLC), overhead clearance, any obstructions to traffic flow, and special conditions along the route (*Figure 1-5*). Determining the route classification formula is discussed in *Lesson 2*.

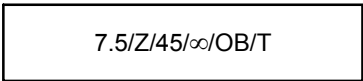


Figure 1-5. Route Classification Formula

1-6. Additional Information. A route reconnaissance overlay will also show the following information, if applicable:

- Curves having a radius equal to or less than 45 meters.
- Slopes that have a percent of slope equal to or greater than 5 percent.
- Reductions in the traveled-way width.
- Overhead obstructions.
- Bridges (to include bypasses).
- Civil or military route designations.
- Locations of fords, ferries, tunnels, and underpasses.

PART B – OVERLAY SYMBOLS

Reconnaissance information is recorded using symbols. These symbols allow a maximum amount of information on the overlay, while using a minimum amount of space. The symbols used to represent information on an overlay are discussed below.

1-7. Constriction Symbol. This symbol (*Figure 1-6*) is used to indicate any reduction in the traveled-way width below the standards shown in *Table 1-1*. The number to the left of the symbol indicates the traveled-way width at the constriction, and the number to the right of the symbol indicates the length of the constriction.

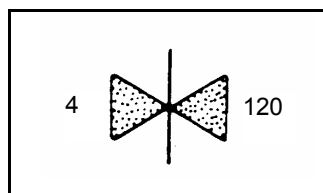


Figure 1-6. Constriction Symbol

Table 1-1. Traveled-Way-Width Standards

	Limited Access	Single Lane	Single Flow	Double Flow
Wheeled	<3.5 m	3.5 to <5.5 m	5.5 to <7.3 m	≥7.3 m
Tracked and combination	<4.0 m	4.0 to <6.0 m	6.0 to <8.0 m	≥8 m

1-8. Underpass Symbol. This symbol is drawn so that it shows the actual shape of the underpass. Sidewalks are drawn if applicable. The underpass is considered an obstruction if the overhead clearance is less than 4.3 meters or when the traveled way is less than the standards shown in *Table 1-1*. The overhead clearance or the traveled-way width will be underlined if either is an obstruction. The width of the traveled way is written on the far left side of the symbol. If sidewalks are present, the traveled-way width is followed by a slash and then the total width is given. On the right side of the symbol, the overhead clearance will be shown. If there is a minimum and maximum overhead clearance, both will be given (*Figure 1-7*). In structures with arched ceilings, an extension of the width does not necessarily mean the structures will accommodate wider vehicles. The underpass symbol will be drawn so that the symbol intersects the route at the point of its geographic location.

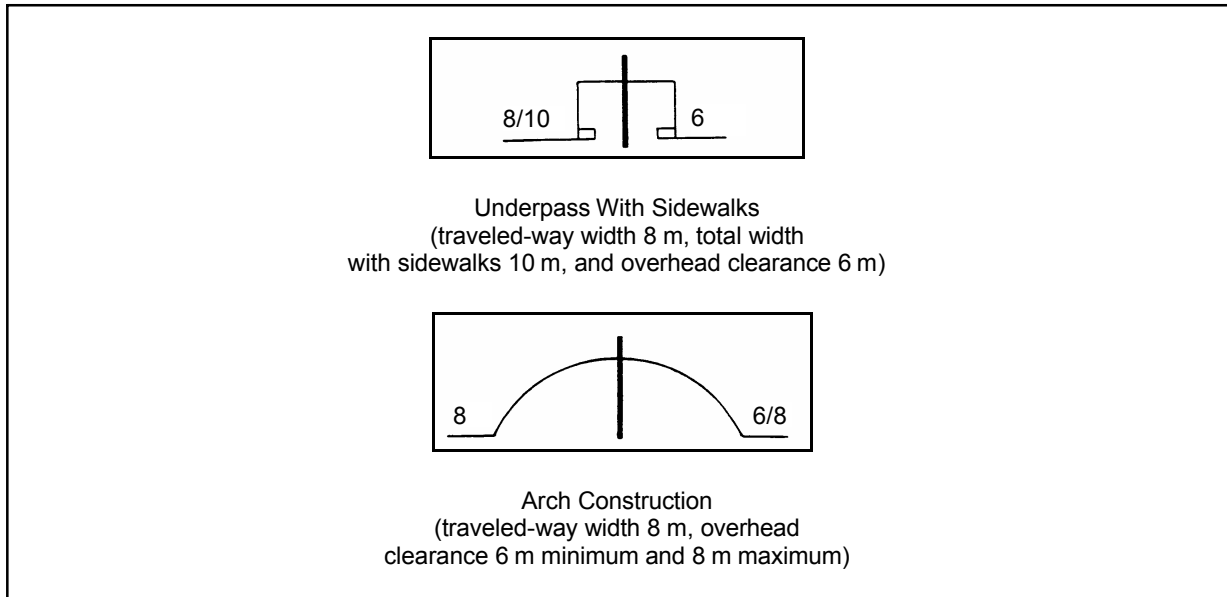


Figure 1-7. Underpass Symbols

1-9. Slope Symbol. Most vehicles that must negotiate slopes (also referred to as grades) of 7 percent or greater for any significant distance will be slowed down. Route reconnaissance is required to locate such obstructions to traffic flow and to accurately report slope characteristics. Reconnaissance symbols have been adopted to portray the gradient (percent of slopes) on maps and overlays (*STANAG 2253*).

a. A single arrowhead along the trace of a route, pointing in the uphill direction, indicates a slope of 5 percent or greater but less than 7 percent. Two arrowheads represent a slope of 7 percent or greater but less than 10 percent. Three arrowheads represent a slope of 10 percent or greater but less than 14 percent. Four arrowheads represent any slope that is 14 percent or greater (*Figure 1-8, page 1-6*).

b. The actual percent of slope is written to the right or to the left of the symbol. Whenever the scale of the map permits, the length of the arrow will be drawn to scale to represent the length of the slope. Slopes of 7 percent or greater are obstructions to traffic flow and are indicated by the abbreviation OB in the route classification formula.

6	↑	5 but less than 7 percent
9	↑↑	7 but less than 10 percent
11	↑↑↑	10 but less than 14 percent
17	↑↑↑↑	14 percent and greater

Figure 1-8. Slope Symbol

1-10. Curve Symbol. Sharp curves along a specified route with a radius of 45 meters and less are represented on maps or overlays by a triangle. The vertex (the point opposite to and farthest from the base) of the triangle will point to the geographical location of the curve on the overlay or map. In addition, the measured value (in meters) for the radius of curvature is written outside the triangle. A series of sharp curves is represented by two triangles, one drawn inside the other. The vertex of the outer triangle points to the geographical location of the curve. The number of curves and the radius of curvature at the sharpest curve of the series are written outside the triangle (*Figure 1-9*).

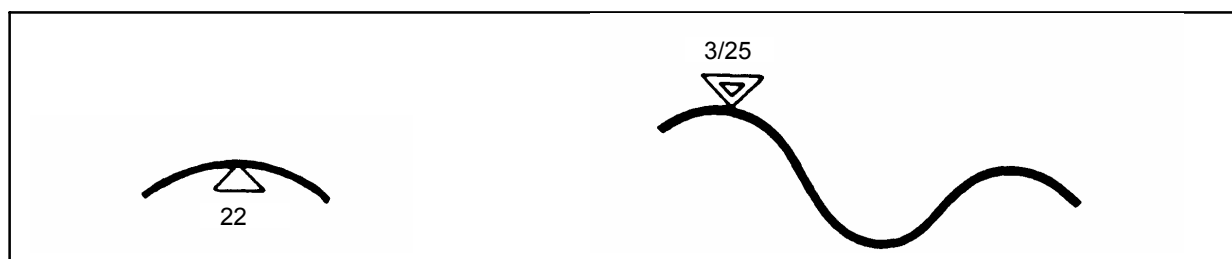


Figure 1-9. Curve Symbols

1-11. Tunnel Symbol. The tunnel symbol (*Figure 1-10*), like the underpass symbol, is drawn to show the actual shape of the tunnel portal. The geographical location is shown on the overlay by a leader arrow coming off the symbol pointing to the entrance of the tunnel. A serial number is assigned to each tunnel to aid in later reference to a specific tunnel. The serial number is recorded in the inside of the tunnel symbol (for example, T-1, T-2, T-3, and so on). The overhead clearance is shown on the left side of the symbol. If the overhead clearance varies, both the minimum and the maximum are given. The overall tunnel length (in meters) is recorded on the right side of the symbol. The traveled-way width (in meters) is recorded beneath the symbol. If sidewalks are present, they are drawn in the symbol. The traveled-way width (plus the sidewalk widths) will be shown with the traveled-way width beneath the symbol.

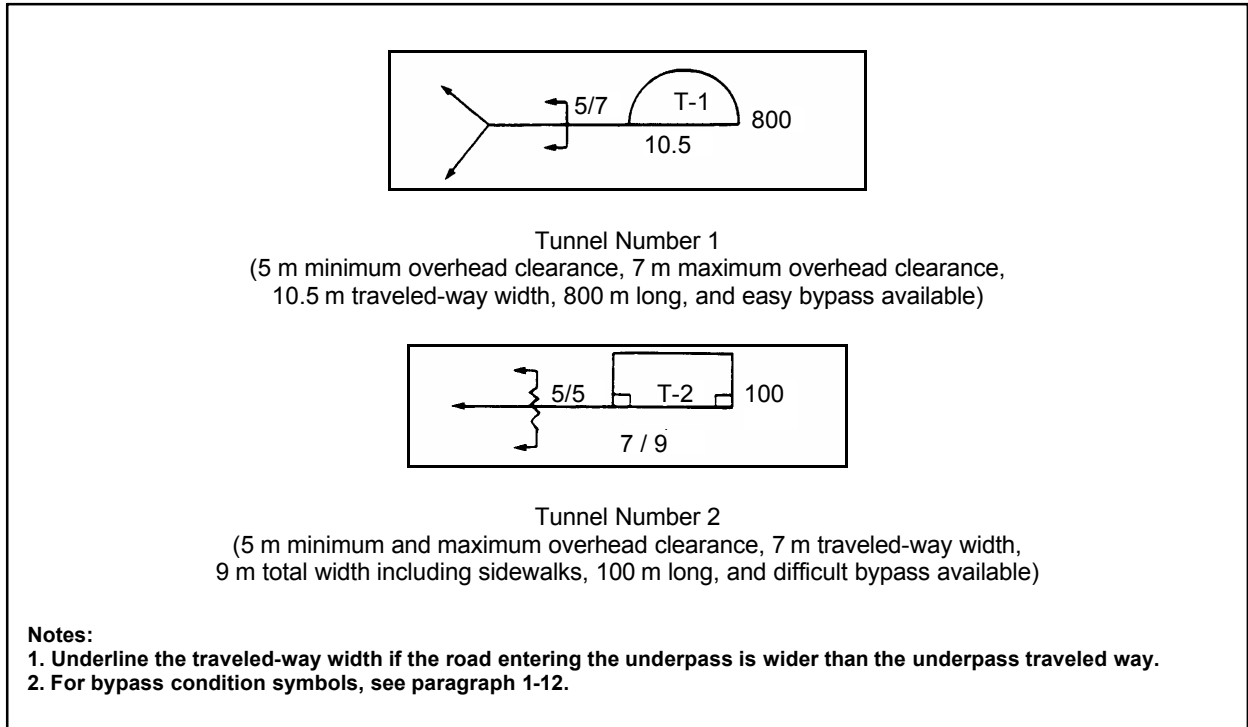


Figure 1-10. Tunnel Symbols

1-12. Bypass Condition Symbol. Bypasses are local alternate routes that can be used to bypass an obstruction. Bypasses that are limited to specific vehicle types (such as vehicles capable of swimming or deep-water fording) are so noted on the reconnaissance report. Bypasses are classified as easy, difficult, or impossible. Bypass conditions must be shown for each tunnel symbol. The bypass condition symbol is placed on a leader arrow. The symbol is used in conjunction with a bridge or a tunnel reconnaissance symbol.

a. Bypass Easy (*Figure 1-11*). This symbol shows that the obstacle can be crossed within the immediate vicinity by a United States (US) 2 1/2-ton truck or a North Atlantic Treaty Organization (NATO) equivalent. When using this bypass, no work will be required. The symbol is placed on the leader pointing to the geographical location of the object (bridge or tunnel).

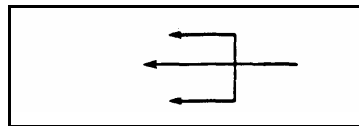


Figure 1-11. Bypass-Easy Symbol

b. Bypass Difficult (*Figure 1-12*). This bypass has the same conditions as bypass easy, except that it will require some work to prepare the bypass. Preparation work will usually take less than 3 hours.

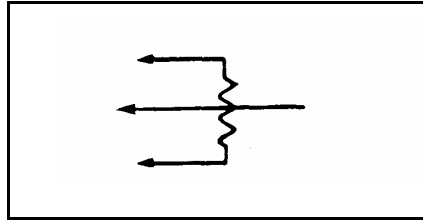


Figure 1-12. Bypass-Difficult Symbol

c. Bypass Impossible (*Figure 1-13*). This symbol shows that the obstacle can only be crossed by one of the following methods:

- Repair of the item (for example, bridge). The repairs usually will exceed 3 hours.
- New construction.
- Detour using an alternate route that is some distance away.

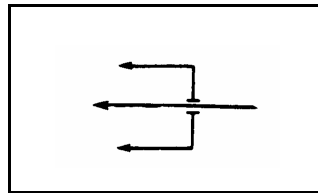


Figure 1-13. Bypass-Impossible Symbol

1-13. Level-Grade Railroad-Crossing Symbol. This symbol (*Figure 1-14*) shows where train tracks cross the route. Passing trains will interrupt traffic flow, so this symbol must be shown on an overlay. If there is an overhead obstruction, an X with a line pointing to the location of the overhead obstruction is used. Beside the X is the distance for minimum overhead clearance. Anytime the overhead clearance is less than 4.3 meters, the given distance for overhead clearance must be underlined. If an overhead obstruction exists without a railroad crossing, an X is used alone.

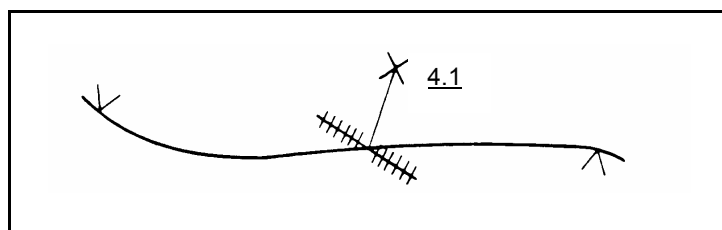


Figure 1-14. Level-Grade Railroad-Crossing Symbol

1-14. Full North Atlantic Treaty Organization Bridge Symbol. Bridge information is recorded on a map or overlay by using the full NATO bridge symbol (*Figure 1-15*). The required data includes the serial number, the geographic location, the MLC, the overall length, the traveled-way width, the overhead clearance, and any available bypasses (*STANAG 2253*). A question mark is used to indicate information that is unknown or undetermined. The question mark is included as part of the bridge reconnaissance symbol.

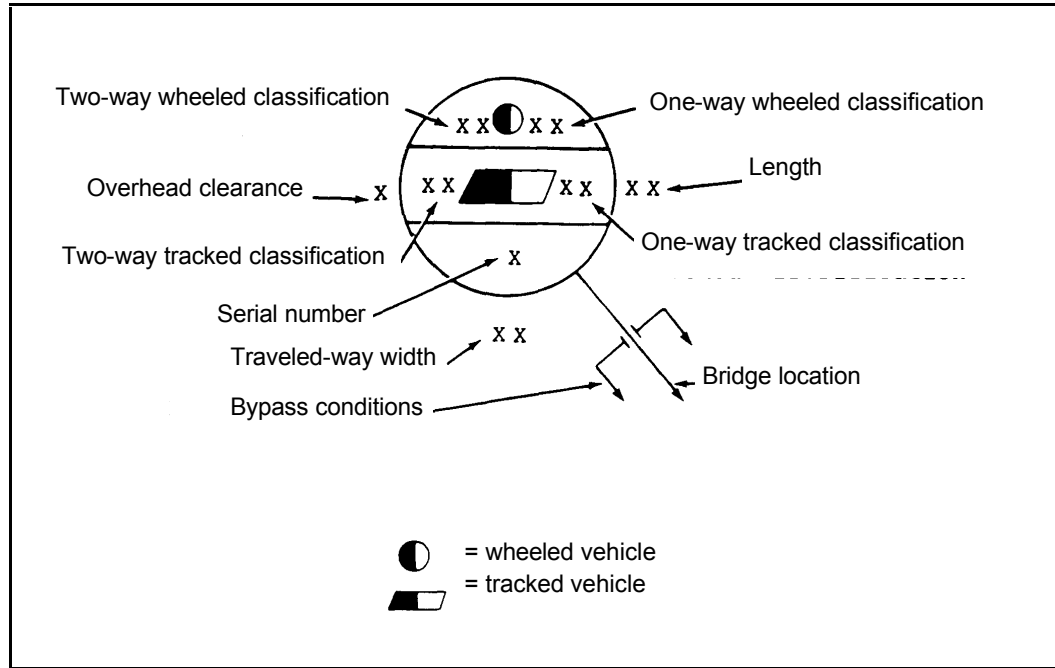


Figure 1-15. The Full North Atlantic Treaty Organization Bridge Symbol

- a. A serial number is assigned to the bridge for future reference and is recorded in the lower portion of the symbol. Serial numbers are not duplicated within any one map sheet, overlay, or document. Later identification requires the map sheet and the overlay number as well as the bridge's serial number.
- b. The geographic location is shown by a line extending from the symbol to the exact map location.
- c. The MLC number is shown in the top portion of the circle. This number indicates the carrying capacity of the bridge (classifications for single- and double-flow traffic are included). In those instances when dual classifications for wheeled and tracked vehicles exist, both classifications are shown.
- d. The overall length is the distance between abutments, measured along the bridge centerline. The length is placed to the right of the circle and is expressed in meters.
- e. The minimum lane width is the clear distance between curbs. This figure is placed below the symbol and is expressed in meters. Bridges may be obstructions to traffic flow because the traveled way of the overall route may be reduced on the bridge to below the minimum standards. If so, the bridge is reported as a width obstruction in the route

classification formula. *Table 1-2* lists the minimum width requirements for one- and two-lane bridges according to MLC. If a one-lane bridge meets all the requirements except the minimum width for a certain classification, the classification is not downgraded. The width is underlined, and appropriate travel restrictions are imposed. A two-lane bridge must meet the minimum lane widths.

Table 1-2. Minimum Lane Width for Bridges

Bridge Classification	Minimum Width Between Curbs	
	One Lane	Two Lane
4-12	2.75 m (9 ft 0 in)	5.50 m (18 ft)
13-30	3.35 m (11 ft 0 in)	5.50 m (18 ft)
31-60	4.00 m (13 ft 2 in)	7.30 m (24 ft)
61-100	4.50 m (14 ft 9 in)	8.20 m (27 ft)

f. The overhead clearance is the minimum distance between the traveled way and any obstruction above it. This figure is shown (in meters) to the left of the circle. Any overhead clearance less than 4.3 meters is underlined. Unlimited overhead clearance is indicated by the symbol for infinity (∞). Any overhead clearance less than 4.3 meters is reported as an obstruction in the route classification formula.

1-15. Ford Symbols. Limited ford information is recorded on maps or overlays by means of symbols (*STANAG 2253*) (*Figure 1-16, page 1-12*). All elements of the ford symbol are separated by slashes. If any item of the ford symbol is unknown or undetermined, a question mark is substituted for the required information.

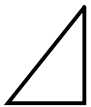
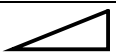

a. The geographical location of the ford is shown by an arrow that extends from the ford symbol to the location of the ford on the map or overlay. The symbol may be drawn on either side of the stream.

b. For later reference, a serial number is assigned to each ford. Numbers must not be duplicated within any one map sheet, overlay, or document. The number is recorded to the extreme left top of the symbol.

c. The ford type is annotated (with the letters V for vehicular or P for pedestrian) after the serial number. The ford type is determined by the waterway's bottom conditions, width, and water depth. Approaches are not considered in determining the ford type. *Table 1-3* is used to determine trafficability of the ford. Only the shallow, fordable depth and the minimum width are used as criteria. Maximum desirable slope will not determine the ford type.

d. Normal stream velocity is placed after the ford type. The velocity is expressed in meters per second (mps).

Table 1-3. Trafficability of Fords

Type of Traffic	Shallow, Fordable Depth	Minimum Width	Maximum Percent of Slope for Approaches ¹
Foot	1.00 m (39 in)	1.0 m (39 in) (single file) 2.0 m (79 in) (columns of 2)	100% 1:1 
Trucks and truck-drawn artillery	0.75 m (30 in)	3.6 m (12 ft)	33% 1:3 
Light tanks	1.00 m (39 in)	4.2 m (14 ft)	50% 1:2 
Medium tanks ²	1.05 m (42 in)	4.2 m (14 ft)	50% 1:2
¹ Based on a hard, dry surface. ² Depths up to 4.3 m can be negotiated with a deep-water fording kit.			

e. Seasonal limiting factors follow the stream velocity notation and are shown by either an X or a Y:

- **X.** No seasonal limitations except for sudden flooding of limited duration (such as flash floods).
- **Y.** Serious, regular, or recurrent flooding or snow blockage. If the Y symbol is used, the route type in the route classification formula automatically becomes Type Z.

f. The length of the ford (in meters) is recorded to the extreme left and below the arrow. The length is computed as the distance from the near shore to the far shore.

g. The width of the ford (in meters) is placed after the length notation. The width of the ford is the traveled-way width of the bottom. The nature of the bottom is indicated by one of the following codes and is annotated after the width.

- M = mud.
- C = clay.
- S = sand.
- G = gravel.
- R = rock.
- P = artificial paving.

h. The normal water depth at the deepest point (in meters) is placed below the arrow, immediately after the symbol expressing the bottom type. During a hasty reconnaissance, the actual water depth is used.

i. The left and right banks of a stream are found by looking downstream. In drawing this portion of the symbol, attention must be paid to the direction of the stream flow. Irregular lines are placed on the corresponding side of the basic symbol to show a difficult approach.

Ford Number 1 is a vehicular and pedestrian ford with a stream velocity of 1.5 mps, no seasonal limitations, 15 m long, 6.5 m wide, a gravel bottom, 0.7 m deep, and a difficult approach on the right bank.	
Ford Number 2 is a pedestrian ford with a stream velocity of 1.2 mps, seasonal limitations, 50 m long, 3 m wide, a rock bottom, 1 m deep, and easy approaches.	
Ford Number 3 is a vehicular ford with stream velocity unknown, no seasonal limitations, 15 m long, 6 m wide, artificial paving, 0.5 m deep, and difficult approaches on both banks.	

Figure 1-16. Ford Symbols

1-16. Ferry Symbol. Limited ferry information is recorded on maps or overlays by means of symbols (*STANAG 2253*) as shown in *Figure 1-17*. A question mark is substituted for unknown or undetermined information.

- An arrow extends from the ferry symbol to the geographic location on the map or overlay. The symbol may be drawn on either side of the stream.
- A serial number is assigned to each ferry for later reference. Numbers must not be duplicated within any one map sheet, overlay, or document. The number is recorded at the extreme left and above the symbol.
- The type of ferry (V or P) is shown after the serial number. If the ferry can haul vehicles, it can also haul pedestrians.
- The MLC of the deck is placed inside the symbol and to the left.
- The dead-weight capacity of the ferry (in short tons) is shown inside the symbol and to the right of the MLC. Dead-weight capacity is the actual load capacity plus the actual weight of the ferry.
- The turnaround time is expressed by the number of minutes required to cross the water obstacle, unload, and return. Special attention must be paid to the direction of stream flow.
- Left and right banks are determined by looking downstream. Approach conditions are determined in the same manner as for fords. Irregular lines are placed on the corresponding side of the basic symbol to show a difficult approach.

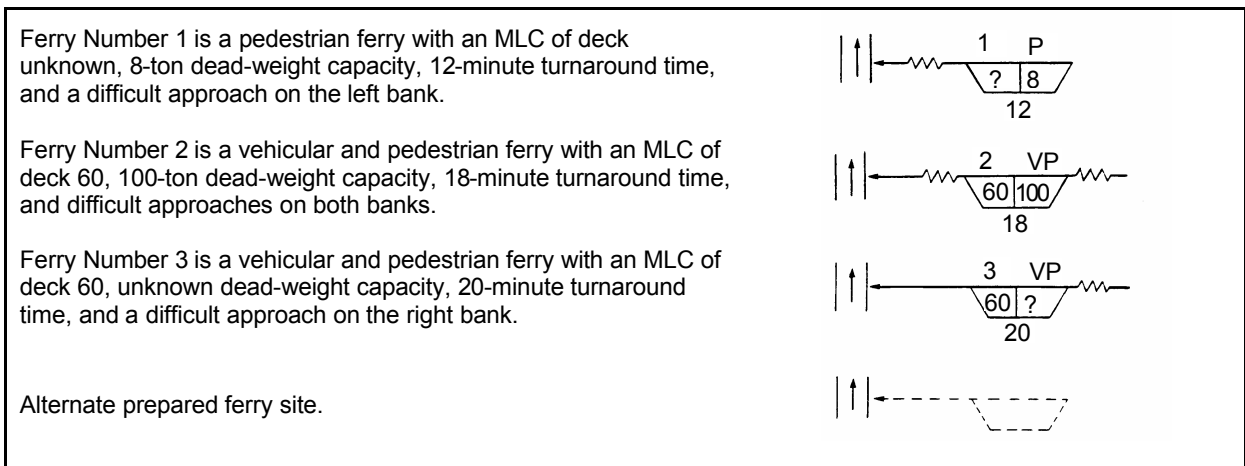


Figure 1-17. Ferry Symbols

1-17. Conclusion. *Figure 1-18, page 1-14, shows an example of a completed overlay. When preparing a route reconnaissance overlay, remember the following:*

- An overlay is a concise drawing of a route and its characteristics.
- There are five required items to include on an overlay:
 - The route, drawn to scale, showing the limit of sector.
 - Two grid reference points.
 - A north-seeking arrow (grid or magnetic).
 - A title block.
 - A route classification formula (discussed further in *Lesson 2*).
- An overlay is required for both a hasty and a deliberate reconnaissance.
- Any limiting characteristics for military traffic will be recorded by using symbols.
- All measurements recorded on the overlay will be expressed in metric terms.

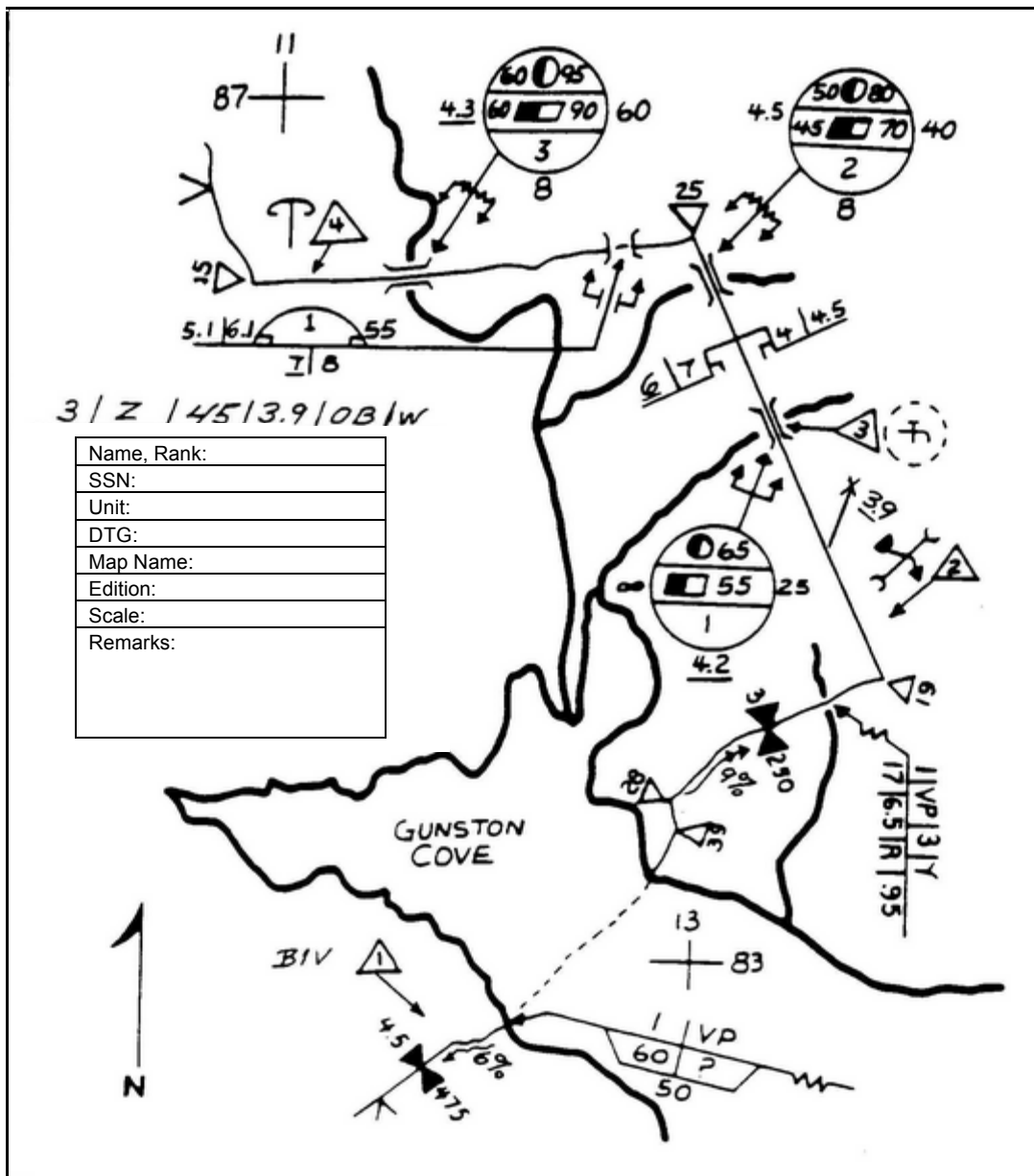


Figure 1-18. Example of a Completed Overlay

LESSON 1

PRACTICE EXERCISE

The following items will test your grasp of the material covered in this lesson. There is only one correct answer to each item. When you complete the exercise, check your answers with the answer key that follows. If you answered any item incorrectly, study again that part of the lesson which contains the portion involved.

1. What are the five required items to include on an overlay?
 - A. A bridge symbol, a north-seeking arrow, a title block, the route, and grid reference points
 - B. The route drawn to scale with the limit of sector, two grid reference points, a north-seeking arrow, a title block, and a route classification formula
 - C. A ferry symbol, a bridge symbol, a title block, a north-seeking arrow, and the route drawn to scale
 - D. A route classification formula, a north-seeking arrow, grid reference points, a map sheet number, and the commander's name
2. The route classification formula is located where on the overlay?
 - A. Anywhere there is room
 - B. The lower lefthand corner
 - C. Above the title block
 - D. At the beginning of the route
3. What does the symbol in *Figure 1* represent?

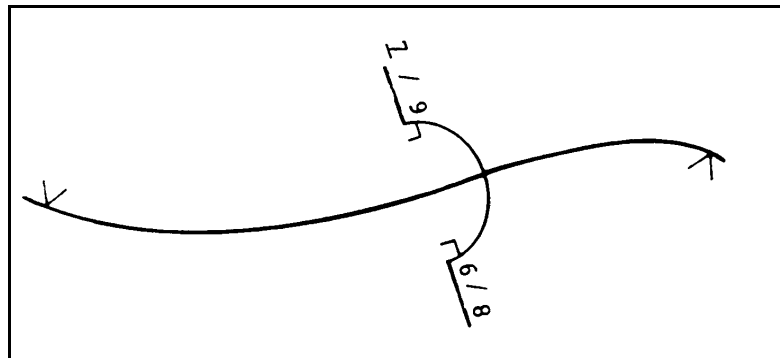



Figure 1


- A. A bridge
- B. A tunnel
- C. A constriction
- D. An underpass

4. Which of the following symbols correctly shows a slope that has an incline of 8 percent?

A. 

B. 

C. 

D. 

5. What does the underlined 4.1 represent in Figure 2?

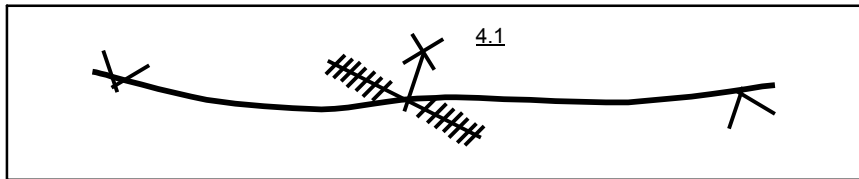


Figure 2


- A. Traveled-way width is less than minimum
- B. Overhead clearance is less than standard
- C. Overhead power lines are present
- D. Overhead obstruction is easy to remove

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LESSON 1

PRACTICE EXERCISE

ANSWER KEY AND FEEDBACK

<u>Item</u>	<u>Correct Answer and Feedback</u>
1.	B. The route drawn to scale with the limit of sector, two grid reference points, a north-seeking arrow, a title block, and a route classification formula (paragraph 1-17, page 1-13)
2.	C. Above the title block (paragraph 1-5, page 1-3)
3.	D. Underpass (paragraph 1-8, page 1-5)
4.	C.  (paragraph 1-9, page 1-5)
5.	B. Overhead clearance is less than standard (paragraph 1-13, page 1-8)

LESSON 2

ROUTE CLASSIFICATION FORMULA

Critical Task: 052-196-3065

OVERVIEW

LESSON DESCRIPTION:

In this lesson, you will learn how to classify a route using the route classification formula. You will also learn how route information is transmitted electronically.

TERMINAL LEARNING OBJECTIVE:

- ACTION:** You will describe the information and procedures required to classify a route using the route classification formula.
- CONDITION:** You will be given the material contained in this lesson.
- STANDARD:** You will correctly answer practice exercise questions at the end of this lesson.
- REFERENCES:** The material contained in this lesson was derived from the following publications: FMs 101-5-1, 5-170, and 5-34.

INTRODUCTION

A route classification formula is required on a route reconnaissance overlay. A route classification formula briefly describes a specific route. The formula is made up of a series of numbers and letters that express, in a standard sequence, the route's width, type, lowest MLC, overhead clearance, and obstructions to traffic flow and any special conditions on the route.

2-1. Formula Components. *Figure 2-1* shows the specific components of the formula. They include the following:

- Route width.
- Route type (X, Y, or Z).
- Lowest MLC.
- Lowest overhead clearance.
- Obstruction (indicated by OB), if present.
- Snow blockage (indicated by T) or flooding (indicated by W), if present.

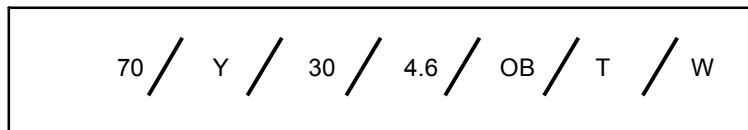


Figure 2-1. Route Classification Formula

a. **Route Width.** The first item of information recorded in the route classification formula is the route width. The width of the route is the narrowest width of the traveled way expressed in meters. This measurement will include bridges, tunnels, roads, and other constrictions.

(1) Route widths are illustrated in *Figure 2-2*. The width of the traveled way determines the number of lanes of a given route. The number of lanes determines the traffic flow.

(2) A route is single flow if it allows a column of vehicles to proceed and individual oncoming or overtaking vehicles to pass at predetermined points. A route is double flow if it allows two columns of vehicles to proceed simultaneously, either in the same or opposite direction.

(3) A width obstruction does not exist for military traffic unless the traveled-way width is less than the minimums outlined in *Figure 2-2*. To obtain the minimum required traveled way, compare the type of traffic and the required traffic flow.

(4) In the absence of other instructions from the commander requesting the reconnaissance, routes are reconnoitered and reported based on the minimum traveled-way width for double-flow, tracked vehicles.

(5) Any time the traveled-way width is less than minimum for traffic type and flow, the traveled way presents an obstruction to traffic. This will be reported as an obstruction.

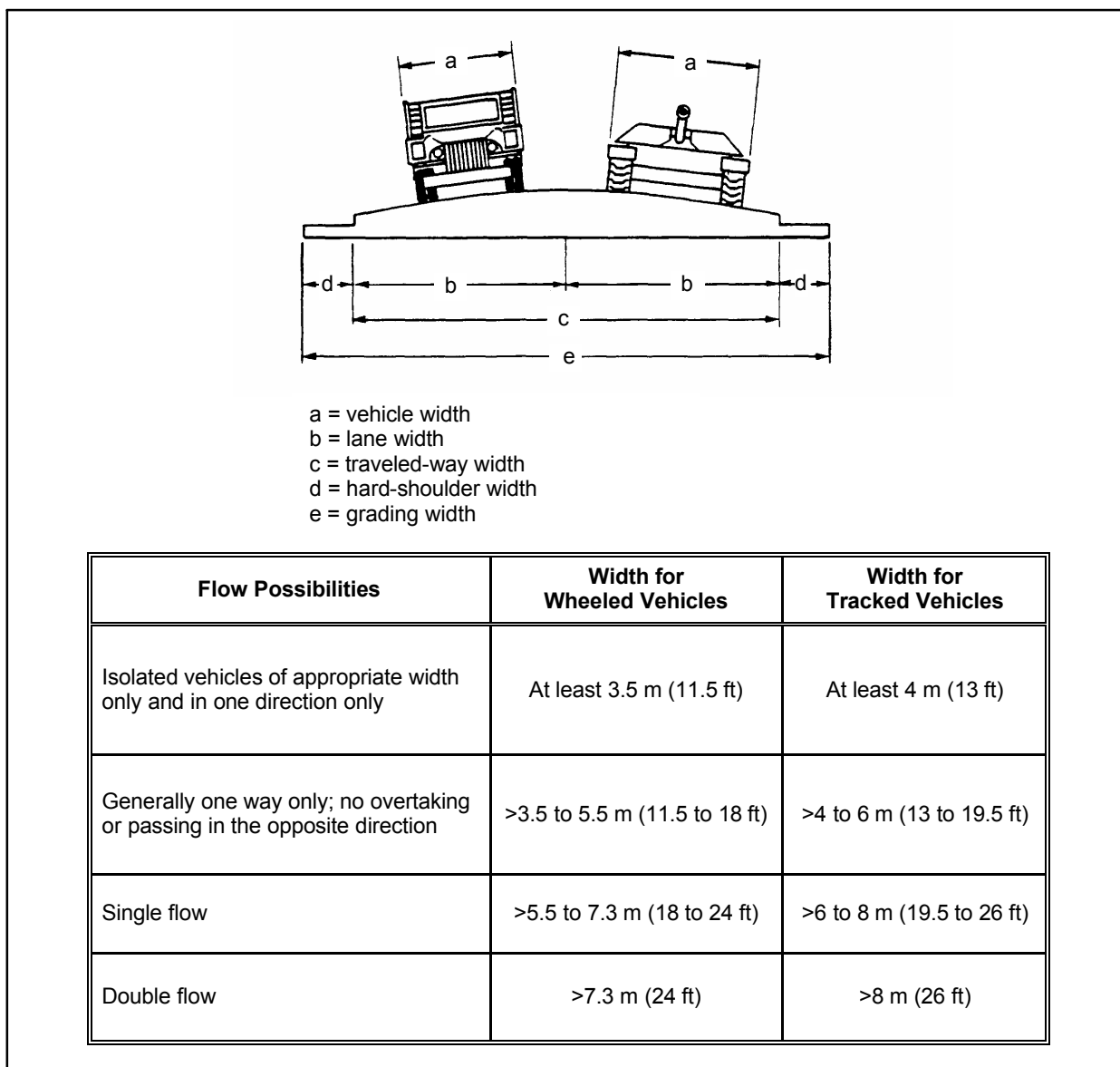


Figure 2-2. Route Widths

b. Route Type. For classification purposes, routes are designated by their ability to withstand the effects of the weather. The worst section of the route determines the route type. The three route types are as follows:

- **Type X.** This is an all-weather route that with reasonable maintenance is passable throughout the year to maximum-capacity traffic. The roads that form this route type normally have waterproof surfaces and are only slightly affected by precipitation or precipitation with temperature changes. At no time is this route closed to traffic by weather conditions other than temporary snow or flood blockage.

- **Type Y.** This is a limited all-weather route that with reasonable maintenance can be kept open in all weather but to less than maximum traffic capacity. The roads that form this route type usually do not have waterproof surfaces. The roads are considerably affected by precipitation and/or temperature changes. The route may be closed for short periods of up to one day due to adverse weather conditions. Continued use of this route in adverse conditions would probably lead to complete collapse of the road.
- **Type Z.** This is a fair-weather route that quickly becomes impassable in adverse weather. This type of route is so seriously affected by adverse weather conditions that it may remain closed for long periods. Improvement of such a route can only be achieved by construction or realignment.

c. **Military Load Classification.** Friendly forces must make maximum use of existing routes. To do this, the military load carrying capacity of the routes for a basic military road must be classified. The MLC assigns whole numbers to vehicles, bridges, roads, and routes. Vehicle classifications are determined by weight, type, and effect on routes. Bridge, road, and route classifications are determined by physical characteristics, type and flow of traffic, effects of weather, and other special conditions. Regardless of traffic type or flow, the lowest bridge MLC number determines the MLC of the route. If no bridge is located on the route, the worst section of the route governs the classification.

d. **Overhead Clearance.** Overhead clearance is the vertical distance between the road surface and any obstruction over it that denies use of the route/road to all vehicles or loads that exceed this height. If clearance is unlimited, symbolize it by using ∞ in the route classification formula.

e. **Obstructions.** Route obstructions are factors that restrict the type, amount, or speed of traffic flow. Route obstructions are indicated in the route classification formula by the abbreviation OB. If an obstruction is shown in the route classification formula, the route reconnaissance overlay will show the exact location and nature of the obstruction. The following obstructions must be reported with an OB in the route reconnaissance formula:

- Overhead obstructions with an overhead clearance of less than 4.3 meters.
- Slopes of 7 percent or greater.
- Curves with a radius of 25 meters or less.
- Fords or ferries.
- Reduction in traveled-way widths that are below the standard minimum prescribed for the type of traffic flow.

f. Snow Blockage and Flooding. The effects of snow are not usually considered an obstruction to traffic flow. In those cases where snow blockage is regular or recurrent and serious, the route classification formula will be followed by a T. The effects of flooding on traffic flow are not usually considered in route classification either. Where flooding is regular or recurrent and serious, the route classification formula will be followed by a W. In the case where the conditions for snow blockage and flooding both exist as described above, both a T and a W will follow the route classification formula.

2-2. Examples. Two examples of route classification formulas follow:

- **20/Z/40/∞.** This example describes a fair-weather route (Z), with a minimum traveled way of 20 meters, and a MLC of 40. Overhead clearance is unlimited (∞), and there are no obstructions to traffic flow. This route, based on its minimum width of traveled-way, accommodates both wheeled and tracked, single-flow traffic without obstruction.
- **20/Z/40/∞ (OB).** This example describes a route with characteristics similar to those of the previous example, but with an obstruction. This obstruction could consist of overhead clearances of less than 4.3 meters, grades of 7 percent or greater, curves with a radius of 25 meters and less, or a ford or a ferry. Twenty feet of traveled way limits this route to single-flow traffic without a width obstruction. If the route is to be used for double-flow traffic, 20 meters of traveled way constitutes an obstruction and is indicated in the formula as an obstruction.

2-3. Electronic Transmission of Route Information. Reconnaissance personnel must often provide commanders with immediate information on selected routes. This is usually accomplished by reporting the route as open or closed. Suggested formats for both situations have been developed (*Figures 2-3 and 2-4, page 2-6*). Although designed for electrical transmission, the formats can be used to supplement overlays or map reconnaissance reports.

2-4. Summary. Remember the following when calculating a route classification formula:

- The numbers and letters used to express route width, route type, MLC, overhead clearance, obstructions to traffic, and special conditions are recorded in a standard sequence.
- The recorded traveled-way width is the minimum width measured on the route.
- An X, Y, or Z will identify the type of route.
- The MLC is usually the lowest class of bridge on the route, regardless of traffic type or flow. If no bridge is present on the route, the worst section of the route will govern the MLC.
- If no overhead obstruction exists, ∞ must be recorded in the formula.
- If obstructions exist on the route, an OB will be noted in the formula.

ROUTEOPENREP	
<u>Letter Designation</u>	<u>Explanation</u>
A	Map sheet(s)
B	Date and time route is opened
C	From grid reference
D	To grid reference
E	MLC number of route
F	Minimum widths
ROUTEOPENREP applies to axial and lateral routes only. Report routes by serial number. The appropriate letter designation must precede each category of information reported.	

Figure 2-3. Route-Open-Report Format

ROUTECLOSEDREP	
<u>Letter Designation</u>	<u>Explanation</u>
A	Map sheet(s)
B	Date and time information was collected
C	From grid reference
D	To grid reference
E	Reason for road closure
F	Estimated duration
G	Detour from grid reference to grid reference including (if possible) MLC of detour, width, type of surface, gradual or sharp curves, and gentle or steep grades
H	Cross-country bypass permitted for (vehicle types and MLC number)
I	Additional information
ROUTECLOSEDREP applies to axial and lateral routes only. Report routes by serial number. The appropriate letter designation must precede each category of information reported.	

Figure 2-4. Route-Closed-Report Format

LESSON 2

PRACTICE EXERCISE

The following items will test your grasp of the material covered in this lesson. There is only one correct answer to each item. When you complete the exercise, check your answers with the answer key that follows. If you answered any item incorrectly, study again that part of the lesson which contains the portion involved.

1. The traveled-way width is expressed in what manner in the route classification formula?
 - A. Feet
 - B. Single or double lane
 - C. Meters
 - D. OB
2. A route that is Type Z, has what characteristic?
 - A. An all-weather route
 - B. A limited all-weather bridge
 - C. A limited all-weather route
 - D. A fair-weather route
3. To be classified as an obstruction, what is the minimum overhead clearance?
 - A. 4.0 meters
 - B. 4.3 meters
 - C. 5.3 meters
 - D. 7.3 meters
4. What symbol is used to show regular, recurrent, and serious snow blockage?
 - A. ∞
 - B. B
 - C. T
 - D. OB

LESSON 2
PRACTICE EXERCISE
ANSWER KEY AND FEEDBACK

<u>Item</u>	<u>Correct Answer and Feedback</u>
1.	C. Meters (paragraph 2-1a, page 2-2)
2.	D. A fair-weather route (paragraph 2-2, page 2-4)
3.	B. 4.3 meters (paragraph 2-1e, page 2-4)
4.	C. T (paragraph 2-1f, page 2-5)

APPENDIX A

LIST OF COMMON ACRONYMS

∞	sign of infinity
ACCP	Army Correspondence Course Program
AIPD	Army Institute for Professional Development
AMEDD	Army Medical Department
APO	Air Post Office
attn	attention
AUTOVON	automatic voice network
AV	automatic voice network
AWR	answer weight reference
DA	Department of Army
DINFOS	Defense Information School
DSN	Defense Switched Network
DTG	date time group
EN	engineer
FM	field manual; frequency modulated
ft	feet; foot
GN	grid north
in	inch(es)
IPD	Institute for Professional Development
Jan	January
JFK	John Fitzgerald Kennedy

m	meter(s)
MANSCEN	Maneuver Support Center
MCRP	Marine Corps reference publication
MI	middle initial
MLC	military load class
MN	magnetic north
MO	Missouri
MOS	military occupational specialty
mps	meter(s) per second
N	north
NATO	North Atlantic Treaty Organization
RCOAC	Reserve Component Officer's Advanced Course
reg	regulation
RS	response sheet
RYE	retirement year ending
SGT	sergeant
SSN	social security number
STANAG	standardization agreement
TM	technical manual
TRADOC	United States Army Training and Doctrine Command
US	United States
USC	United States Code
VA	Virginia

APPENDIX B

RECOMMENDED READING LIST

The following publications provide additional information about the material in this subcourse. You do not need these materials to complete this subcourse.

DA Form 1711-R. *Engineer Reconnaissance Report*. 1 May 1985.

FM 101-5-1. *Operational Terms and Graphics (MCRP 5-2A)*. 30 September 1997.

FM 5-170. *Engineer Reconnaissance*. 5 May 1998.

FM 5-34. *Engineer Field Data*. 30 August 1999.

STANAG 2253. *Roads and Road Structures*. 29 January 1982.

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APPENDIX C

METRIC CONVERSION CHART

This appendix complies with current Army directives, which state that the metric system will be incorporated into all new publications. *Table C-1* is a metric conversion chart.

Table C-1. Metric Conversion Chart

US Units	Multiplied By	Equals Metric Units	Metric Units	Multiplied By	Equals US Units
Length					
Inches	25.4001	Millimeters	Millimeters	0.03937	Inches
Inches	2.5400	Centimeters	Centimeters	0.39370	Inches
Feet	0.3048	Meters	Meters	3.28100	Feet
Yards	0.9140	Meters	Meters	1.09360	Yards